Preserving Biodiversity

For use with: Arizona Wildlife Views Television Show, 08-09 Season, Episode 3

Human-Environment Interactions; Habitat Restoration; Invasive Species; Technology

Time Frame: 3-4 hours **Grade:** 4-8

Overview:

This video focuses on some very different techniques that individuals are using to preserve biodiversity in Arizona. First, we look at a project led by the Federal government in which periodic flooding is brought back to the Grand Canyon, this time by releasing water from the dams. Scientists then work to see the impact that these floods have on the ecosystem. Next, we visit an avid birdwatcher who is interested in capturing the sounds of nature. He has been recording the songs of birds and studying their communication. Finally, we learn what biologists are doing to help the bass in some central Arizona reservoirs fight off a highly invasive species. Students will try their hand at recording nature sounds.

Essential Questions

- How do biologists manage wildlife populations?
- How can human activities benefit and harm wildlife?
- How do changes to an ecosystem affect the survival of an organism?

Objectives

- Explain the purpose of resuming floods along the Colorado River.
- Describe how technology has improved the study of fish biology.
- Explain the challenges of removing invasive species from an ecosystem.
- Create a recording of nature sounds to be presented to the public.

Arizona Department of Education Standards

Science

4th grade	5th grade	6th grade	7th grade	8th grade
S2-C1-PO2	S3-C1-PO1	S2-C1-PO3	S2-C1-PO3	S2-C1-PO4
S3-C1-PO1	S3-C2-PO2	S2-C1-PO4	S2-C1-PO4	S3-C1-PO2
S3-C1-PO2		S3-C2-PO4	S3-C1-PO1	
S4-C3-PO4			S3-C1-PO2	

Workplace Skills

4th – 8th grades
5WP-E3-PO1

Technology

4th – 8th grades	
1T-E2-PO3	4T-E2-PO1

Materials and Resources

- Copy of Arizona Wildlife Views episode
- Audio or video recording devices (i.e., tape recorders, digital voice recorders, cell phones, video cameras)
- Computer with Internet access

Teacher Preparation

- Acquire a copy of the television show. You can check local listings to determine when it will air and record it directly. You may also check the Department's web site to see if a copy can be downloaded or ordered.
- Write the vocabulary words and questions on the board.

Background Information:

This is not a lesson plan in the traditional sense. It does not provide step-by-step directions for completing an activity. Instead, it provides information to help you use an episode of the *Arizona Wildlife Views* television program in

your classroom. It contains five suggested activities along with extensions and modifications. The first activity focuses on vocabulary. We have provided and defined some of the words used in the video. You are encouraged to use any appropriate strategies to introduce these to your students. Then, there is a series of comprehension questions that students can answer while watching the video. Answers (directly from the video) are provided in italics. Next, the critical thinking questions build on the major concepts introduced in the video. Students need to put a little bit more thought into these questions. Some reasonable answers are provided in italics. However, teachers should be cautious and realize that students may provide additional answers that can be supported with evidence. Then, there is an in-depth activity. This activity allows students to evaluate and synthesize one or more of the concepts from the video, perhaps applying it to a new context or utilizing additional skills. The last activity allows students to explore wildlife-related careers in a little more detail.

This episode originally aired on PBS (KAET Channel 8) in Phoenix on February 1, 2009. It may also be shown on regional PBS stations or other channels. For additional viewing information or download options, please visit **http://www.azgfd.gov/focuswild**.

Additional information about the programs featured in this episode can be found at:

- ✓ Grand Canyon Monitoring and Research: http://www.gcmrc.gov/research/high_flow/2008/
- ✓ USGS Controlled Flood Rationale: http://water.usgs.gov/wid/FS_089-96/FS_089-96.html
- ✓ USGS Controlled Flood: http://walrus.wr.usgs.gov/grandcan/flood.html
- ✓ Nature Recordings: http://www.naturesongs.com/
- ✓ Golden Algae Project: http://www.azgfd.gov/w_c/research-golden-algae.shtml
- ✓ Golden Alga Frequently Asked Questions: http://www.azgfd.gov/temp/golden_alga_faqs.shtml
- ✓ United Arizona Anglers: http://unitedazanglers.org/

Relevant Vocabulary:

- o Acre-feet – a common measurement of water which is equal to the amount of water necessary to cover an acre of land with water to a depth of 1 foot, or 43,560 ft^3
- o Age Class – a group of individuals that have the same age
- o Angler – a person who fishes
- o Dialect – a version of a language found in a certain region
- o Fingerling – a young fish that is not yet an adult
- o Self-sustaining – population able to survive without help
- o Shad – a type of fish, often used as bait, which is a major food source for bass
- o Spawning – the process of laying eggs and fertilizing them

Comprehension Questions:

1. When was Glen Canyon Dam completed? *Answer: 1963.*
2. How much water was released during the most recent controlled flood? *Answer: About 41,000 ft^3/sec for 60 hours.*
3. When was the first man-made, controlled flood in the Grand Canyon? *Answer: 1996.*
4. How much water is stored in Lake Powell when it is full? *Answer: 27 million acre-feet.*
5. What was Arizona's first IBA, or Important Bird Area? *Answer: Tuzigoot IBA, which included Tavasci Marsh and Peck's Lake.*
6. How many birds can be found at that IBA? *Answer: Over 200 different species.*
7. What three major reservoirs are found along the Salt River? *Answer: Saguaro,*

Canyon, and Apache Lakes. Roosevelt Lake is also found on the Salt River but was not mentioned in the video.

8. Which invasive species is severely affecting the bass in those lakes? *Answer: Golden algae.*
9. Where did the bass used to stock these lakes come from? *Answer: The Inks Dam Hatchery near Burnet, Texas.*

Critical Thinking Questions:

1. What was the purpose of the series of man-made, controlled floods through the Grand Canyon? *Answer: The purpose of the floods is to attempt to recreate the regular ecosystem disturbance along the river. Prior to human settlement and the creation of the dam, the river periodically flooded. In fact, it was this flooding behavior that helped shape the Grand Canyon. By creating the artificial floods, biologists hope to restore some of the habitats to their pre-dam levels. This will ultimately help the native fish and other wildlife dependent on the river ecosystem.*
2. How has technology helped biologists studying fish in the Colorado River? *Answer: This video showed biologists using a technique called electrofishing, in which an electric current is sent through the water to temporarily shock the fish and make them float to the top and become easier to catch. This technological advancement has greatly improved the study of fish. Biologists can now gather larger amounts of fish in a short amount of time.*
3. Why can't the invasive species affecting the bass in the Salt River lakes be removed? *Answer: In general, it is often difficult to remove any invasive species once it settles into its new environment. In the case of golden algae, it is particularly difficult because the lakes are so large. It is impossible to find all the locations within the lake where the algae could be found. If you couldn't get them all, then the remaining one would just spread across the lake. In addition, the amount of chemicals necessary to remove the algae is impractical. Not only would that amount of chemicals be dangerous to the ecosystem, the financial cost is much too large. And there would be no guarantee it would even eliminate all of the algae.*

In-Depth Activity: Wildlife Recording

This video featured Doug Von Gausig, who spends his life recording the songs and other calls of birds. He was doing so in an attempt to preserve their sounds and to learn a little about how they communicate.

Recording, whether it is audio or video, can be a useful tool for biologists. It would be absolutely impossible for anyone in the field to observe everything that takes place. By recording the moment, the biologist can take it back into the lab and study it in more detail. Sometimes, as in the case with audio recordings, the computer can "map" those sounds and even more details can be uncovered.

To hear examples of some bird (and other animal) recordings, visit the following web sites:

- http://www.naturesongs.com/
- http://askabiologist.asu.edu/expstuff/experiments/birdsongs/index.html

Now it is your turn. You are going to try to record nature, learn a little about it, and try to educate others.

First, decide how you are going to record. It could be a tape or digital recorder, a video camera, or maybe even your cell phone.

Now, spend a few moments outside. Try to select a location that is as "natural" as possible. Be quiet and listen to the sounds around you. What do you hear? Wind rustling the leaves? Birds calling from a nearby branch? Crickets chirping?

Decide what you want to record and start recording. It is probably best to record a number of different sounds or sights. Make sure you are documenting what you record. You don't want to get back to the classroom and forget what was making the sound. Once you feel you have some good sounds, return to the classroom.

Now, use some basic audio editing software to create an audio file. (Note: A pretty good free sound editor can be found at **http://audacity.sourceforge.net/**.) Be creative with your file. You don't want to just make it include the sound of the bird or the wind. Be sure to describe what you are hearing. Could you determine that it was a specific type of call? Perhaps the bird was trying to scare you away? Be sure to include that in your audio file.

If possible, put all of the different audio files created by you or the class onto a class web site. You now have created an online source for nature sounds. Continue to add to the files throughout the year.

Career Focus

This video provided a brief look at one or more careers related to wildlife management and conservation. These careers are listed below along with the segment of the video in which they appeared.

Watch the segments related to the specific career. Write down notes about how this career helps wildlife. Use the Internet to research additional information about this career, including specific job duties, education and training required, potential salaries, and future outlook.

Careers featured in this episode:

- Audio-Visual Specialist (Segment 2)
- Wildlife Biologist (Segments 1 and 3)

Differentiated Instruction:

Extensions:

- **Language Arts:** Research golden algae. Where did it come from? How does it spread? Why is it bad? What solutions do we have to deal with it? Write an essay about golden algae.
- **Social Studies:** Use the Internet to research the history of the Grand Canyon and the Glen Canyon Dam. Create a timeline of important events. Be sure to include major laws affecting the area, such as the Grand Canyon Protection Act.
- **Geography:** Just about every lake in Arizona is man-made, created by a dam. Below are some of the dams found along the Salt River and the Colorado River:
  - Davis
  - Glen Canyon
  - Hoover
  - Horseshoe Mesa
  - Mormon Flat
  - Parker
  - Stewart Mountain
  - Theodore Roosevelt

  Use the Internet or other resources to determine on which of the two rivers each dam is found, what lake was created by the dam, and when the dam was built. On a map of Arizona, mark each of the dams, lakes, and dates.

Modifications:

- Create a student handout with the vocabulary words and questions already provided.
- Provide students with the definitions and have them match them to the appropriate vocabulary words.
- Provide fill-in-the-blank responses for the Comprehension Questions, allowing students to listen for appropriate words to complete the sentences.
- Download the video transcripts (if available) and provide to students.

Reflection:

Use the space below to reflect on the success of the lesson. What worked? What didn't? These notes can be used to help the next time you teach the lesson. In addition, the Department would appreciate any feedback. Please visit **http://www.azgfd.gov/focuswild** and submit a lesson evaluation.